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# Content Based Image Retrieval Using Combined Features (Color and Texture)

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***Abstract— The purpose of this paper is to outline our research and solution to the problem of designing an Image Retrieval System based on combined features (color, texture) of image. Due to the massive increase in image database sizes, as well as its broad formation in various applications, the need for CBIR development arose. Firstly, this paper framework a description of the low level features of an image; texture, color. The color feature is extracted using histogram method, and makes a feature vector of color. Then Texture feature are extracted using GLCM (Gray Level Co-occurrence Matrix), and make a feature vector of texture. And then combined both (color, texture) feature vector. after that we use Euclidian distance formula for calculating distance between the combined feature vector(color, texture)of query image and combined feature vector(color, texture) of database image .After that, we sort these distance and most similar four images are displayed those have least distance. Our final result was a Mat Lab built software application that retrieves images from the database.***

Keywords—**Content Based Image Retrieval, GLCM, Color, Texture, Histogram.**

## I. Introduction

Image Retrieval is the field of study concerned with searching and retrieving digital images from a collection of database. Image retrieval attracts interest among researchers in the fields of image processing, multimedia, digital libraries, remote sensing, astronomy, database applications and others associate area. An effectual image retrieval system is able to operate on the collection of images to retrieve the applicable images based on the query image which conforms as closely as possible to human perception. Now a days, due to exponential increase in the size of the so called multimedia files in recent years causes retrieval of images from large datasets very crucial. The detonative growth of image data leads to the need of research and development of Image Retrieval. Two major research communities (database management and computer vision) study image retrieval from different perspectives, one being text-based and the other visual based [1].Text-based image retrieval techniques employ text to describe the content of the image while visual based or content-based image retrieval (CBIR) used visual features to describe the content of images. However, Image retrieval investigates is moving from keyword, to low level features and to semantic features. From historical perspective, one shall notice that the earlier image retrieval systems are rather text -based search since the images are required to be annotated and indexed accordingly. However, with the substantial increase of the size of images as well as the size of image database, the task of user based annotation becomes very hectic. This motivates the research into content-based image retrieval (CBIR).

## II. Problem Statement

There are many problems associated with retrieving images based on text such as manual annotation of keywords, differences in perceptions and interpretations, and a few others. CBIR is an important alternative and complement to traditional text-based image searching and can greatly enhance the accuracy of the information being returned. But most of the CBIR system used single feature for retrieving the image from database, which is not a good solution for the accuracy and efficiency. For this reason in our proposed system we used a combined feature (color and texture) of image with matching based on most similar highest priority principle.

## III. Motivation

Image databases and collections can be large in size, containing hundreds, thousands or even millions of images. The traditional method of image retrieval is searching for a keyword that would match the descriptive keyword assigned to the image by a human categorizes. Presently under development, even though several software exists, is the retrieval of images based on their confine, called Content Based Image Retrieval, CBIR. While computationally costly, the results are far more than traditional image indexing. Hence, there exists a trade-off between accuracy and computational cost. Using single feature for image retrieval cannot be a good solution for the accuracy and efficiency. The proposed method is based on combined feature of images sub-blocks with matching based on most similar highest priority principle which enhances the retrieval performance.

## IV. Proposed Method

This proposed method is based on combined (color and texture) feature with matching based on most similar highest priority principle.

### A. Extraction of Color of an image.

First, the images with other than 256*384 sizes are resized to 256*384. Then convert the image into grayscale image, because RGB and indexed images carry high values that require more computation time[1]. This process reducing the computation time and power required for extracting feature from an image. Hence, the images are converted to gray scale in order to reduce the vast spectrum of indexed images or the 3D components of RGB to 2D component carrying values between 0 and 255. After that we use equalization function to enhance contrast of values of an image by generating its flat histogram. The histogram equalized image is split into four fixed bins in order to extract more information from it. The frequencies of 256 values of gray scale are split into sixteen bin carrying 16 values each(0-15, 16-31, 32-47 and so forth). The information from bins is stored in the form of a feature vector.

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Fig 1: greyscale image

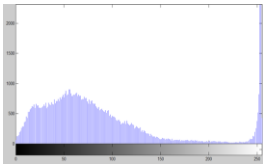
Fig2:histogram of greyscale


Fig 3: image Equalization

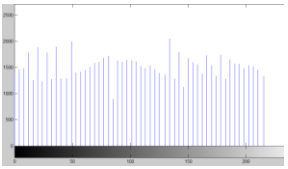
Fig 4:histogram of equalized

B. Extraction of texture of an image

Texture is that innate property of all apparent that describes optical patterns, each having properties of homogeneity. It contains essential knowledge about the functional arrangement of the apparent, such as; clouds, leaves, bricks, fabric, etc. In our proposed method we have used the statistic texture feature using gray-level co-occurrence matrix (GLCM). GLCM is created in four directions with the distance between pixels as one. Texture features are obtained from the statistics of this matrix. At first the co-occurrence matrix is organized based on the direction and distance between image pixels. Then meaningful statistics are obtained from the matrix as the texture representation. It is a matrix showing how often a pixel with the intensity (gray level) value i occurs in a specific spatial relationship to a pixel with the value j. it is defined by $p(ij|d,\theta)$, which expresses the probability of the couple of pixels at direction and d interval. Once the GLCM is created various features can be computed from it. The most commonly used appearance contrast, energy, entropy, correlation and homogeneity. We have taken d=1 and $\theta$=0,45,90,135 for computing the texture appearance contrast, energy, correlation and homogeneity are taken in all the four directions and entropy of the whole image is separately calculated as it gave better retrieving results . And, then combined both features vector generated by color and texture.

C. Used most similar highest priority principle.

After combining the feature vector of color and texture of a query image. The same process will be apply on database images for extraction of color and texture features and then combined these feature (color and texture). After that we use Euclidean distance formula for calculating the distance between the feature vector of query image and database image. we store all database image distance in array and sort these distance and retrieve four most similar images from database.

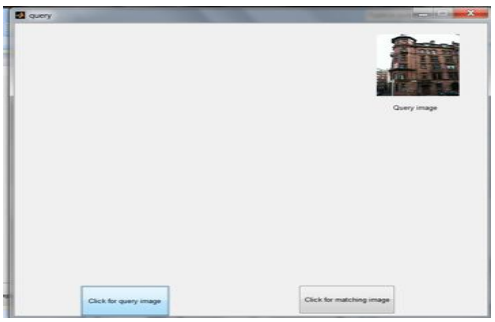

Fig 5: Query figure

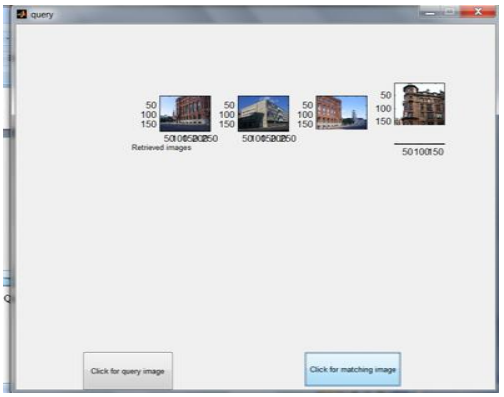

Fig 6: Result figure

## V. Conclusion

The dramatic rise in the sizes of images databases has stirred the development of effective and efficient retrieval systems. The development of these systems started with retrieving images using textual connotations but later introduced image retrieval based on content. This came to be known as CBIR or Content Based Image Retrieval Systems. Here I extract color feature of image using histogram method and then extract texture feature using GLCM (Grey level co-occurrence) method, then combined both feature (color, texture) of image and make a combined feature vector. After this I compare feature vector of query image to feature vector of database images using Euclidean distance, and find four similar images from database which have minimum distance. A more detailed step would further enhance these texture results, using a shape-based search. So, I will work on this feature to enhance the result more accurately.

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